

## Occlusal Forms and Philosophies in Full Mouth Rehabilitation: A Literature Review

Dr. Richa Sahai<sup>1</sup>, Dr. Usha Radke<sup>2</sup>, Dr. Sumeet Jalan<sup>3</sup>, Dr. Ojas Gajbhiye<sup>4</sup>

VSPMDCRC, Nagpur.

### Abstract:

Full mouth rehabilitation encompasses the execution of all the steps necessary to produce healthy, esthetic, well-functioning, and self – maintaining masticatory mechanism. The aim is to restore the tooth to its natural form, function and esthetics while maintaining the physiologic integrity in harmonious relationship with the adjacent hard and soft tissues, all of which improves the oral health and quality of life of the patient. It is a complex procedure which involves multiple steps and active participation between prosthodontist, patient and technician to achieve a satisfactory treatment outcome. The apprehension and doubt associated with such procedures are usually associated with an array of available techniques and philosophies. Careful and meticulous diagnosis and formulation of treatment plan holds the key. This article reviews the various occlusal forms, schemes and philosophies associated with Full Mouth Rehabilitation in the existing literature.

**Keywords:** Full mouth rehabilitation, Occlusal concepts/philosophies, Occlusion

**Introduction:** Full mouth rehabilitation entails the performance of all the procedures necessary to produce healthy, esthetic, well-functioning, and self – maintaining masticatory mechanism<sup>[1]</sup>.

The target is to rehabilitate the tooth to its natural form, function and esthetics while maintaining the physiologic integrity in harmonious relationship with the adjacent tissues, all of which enhance the oral health and quality of life of the patient.

### Goals (Schuyler)<sup>[2]</sup>:

- A static co-ordinated occlusal contact of the maximum number of teeth in centric relation.
- An anterior guidance that is in harmony with the lateral eccentric position on the working side
- Disclusion by the anterior guidance of all posterior teeth in protrusion
- Disclusion of all non-working inclines in lateral excursions.
- Group function of the working side inclines in lateral excursions

If these goals are to be achieved few guidelines have to be followed<sup>[3]</sup>. They are

- Requirement of reorganizing the occlusion
- Suitable occlusal scheme
- Change in occlusal vertical dimension
- Requirement of replacement of missing teeth

The effects of the type of restorative material used on occlusal stability of para-functional habits and Temporomandibular Joint Disorders (TMD).

There are mainly 2 approaches to achieve such rehabilitation<sup>[4]</sup>.

**Conformative approach:** Construct the restoration to conform to patients existing inter cuspal position.

This can be done in two situations, such as:

- Occlusion is not altered prior to tooth preparation although minor changes can be made on restoration such as elimination of the non-working contacts.
- Occlusion is modified by localized occlusal adjustment before tooth preparation. E.g.:elimination of working side interferences and removal of a deflective contact on tooth restored.

## LITERATURE REVIEW

**Reorganized approach<sup>[5]</sup>** : Entire occlusal scheme is modified and restoration provided in harmony with new jaw relation so as to:

- Provide a reproducible starting point i.e. centric relation position
- Provide an even, stable occlusion.
- Provide an occlusion that is in harmony with functional movements.
- Ensure that pathologic deflective contacts are not introduced.
- Provide posterior stability to prevent anterior drifting

Reorganization may be considered when the existing intercuspatation is considered unsatisfactory for any of the following reasons

- Repeated fractures of existing teeth or old restoration
- Bruxism
- Lack of interocclusal space for restoration
- Trauma from occlusion due to excessive or abruptly directed forces.
- Compromised function – unstable tooth contacts with tilting and supraeruption of teeth hampers mastication.
- Compromised esthetics- change of clinical heights necessary to improve esthetics.
- TMD
- Developmental anomalies e.g. amelogenesis imperfecta.

There is no ideal technique to achieve this in every patient. There are 4 basic steps in harmonizing anterior guidance<sup>[4]</sup>:

1. Establish coordinated centric stops on all anterior teeth
2. Extend centric stops forward at the same vertical to include light closure from the postural rest position
3. Establish group function in straight protrusion
4. Establish ideal anterior stress distribution in lateral movements

**Occlusal Schemes:** There are various occlusal schemes which are used to rehabilitate such cases. Each type has its own indication and contraindication<sup>[6]</sup>.

**Mutually Protected Occlusion:** The concept was developed from the work of D'Amico<sup>[7]</sup>, Stuart, Stallard<sup>[8]</sup> and Lucia<sup>[9]</sup> and the members of Gnathological Society established by McCollum in mid 1920s. Stallard and Stuart (1961) changed the term mutually protected occlusion to organic occlusion in which centric relation and MIP coincided. Cusps of posterior teeth should contact in centric occlusion while, in lateral excursions only opposing canines should contact and in protrusion only the anterior teeth should contact.

The posterior teeth are in a cusp to fossa relation. The anterior teeth disocclude by 25microns.

**Canine guided occlusion:** In 1915, Gysi introduced the scheme of canine protected occlusion. D'Amico in 1958 studied the significance of cuspid teeth and presented the Concept of Canine Guidance (Canine disclusion) in which the maxillary canine teeth serve to guide the mandible during eccentric movements. When in functional contact with the lower teeth, it guides both lateral and protrusive movements of the mandible. Thus preventing any force other than the axial loading.

**Group Function Occlusion:** Schuyler (1929) introduced the principles of group function occlusion. It is defined as multiple contact relations between maxillary and mandibular teeth in lateral movements on the working side, whereby simultaneous contact of several teeth, act as a group to distribute occlusal forces. The group function of the teeth on working side evenly distributes the occlusal forces on all the teeth. The posterior teeth on the working side contact during excursive movements, but not those on the non-working side. The desired working contacts are only those between the upper and lower buccal cusps-lingual cusp working contacts are not wanted, nor are posterior protrusive contacts.

**Philosophies in full mouth Rehabilitation**

**Pankey–Mann–Schuyler technique<sup>[10]</sup>** : Their

## LITERATURE REVIEW

philosophy was based on the spherical theory of occlusion, the “wax chew-in” method stated by Meyer and Brenner, and on the role of cuspid teeth as described by D’Amico.

### Steps for Pankey–Mann–Schuyler technique<sup>[11]</sup>

**Part I:** Examination, Diagnosis, Treatment planning and Prognosis

**Part II:** Harmonization of the anterior guidance for best possible aesthetics, function & comfort

**Part III:** Selection of an acceptable occlusal plane and restoration of the lower posterior occlusion in harmony with the anterior guidance in a manner that will not interfere with condylar guidance.

**Part IV:** Restoration of the upper posterior occlusion in harmony with the anterior guidance and condylar guidance.

**Hobo’s twin table philosophy<sup>[12]</sup>:** Dr. Sumiya Hobo introduced Twin table concept which developed anterior guidance to create a harmonious disclusion with the condylar guidance.

- The first incisal table is termed incisal table without disclusion.
- The second table is used to develop Incisal guidance with disclusion the articulator is made to simulate border movements by placing 3 mm plastic separators behind the condylar elements.

The first incisal guide table is used to develop restorations for posterior teeth.

The second guide table is used to develop incisal guidance with disclusion.

### The Functionally Generated Path Technique<sup>[13,14]</sup>:

The original technique was described by Meyer for obtaining the ‘functional occlusal path’ for complete dentures and fixed partial denture fabrication.

### Other philosophies:

**Restoring occlusion to long centric:** The term ‘Long Centric’ could be defined as ‘freedom to close the mandible either into centric relation or slightly anterior to it without changing the vertical dimension of occlusion’. It is also known as “Freedom in Centric”. Area of freedom between CR, and IP is

around 0.5 +/- 0.3 mm.

### Concepts used in advanced periodontal situations:

Nyman and Lindhe concept

Youldelis concept

### Treatment techniques:

- Simultaneous restoration of both arches (Bailey, Grubb, Linkow)
- Individual quadrants (Pankey, Mann, Dawson, Granger)
- Segmented simultaneous arch technique (Binkly & Binkly)

**Discussion:** Posterior disclusion refers to absence of contact on any posterior teeth in any position but centric relation. It can be accomplished easily with cusp tip-to-fossa morphology. It must also be achieved with tripod or surface-to-surface morphology to prevent lateral interferences in any conditions with centric contact on inclines that are steeper than the lateral border movements of the mandible. There are two techniques of accomplishing posterior disclusion:

1. The anterior guidance is harmonized to functional border movements first and then the lateral inclines of the posterior teeth are disoccluded by a correct anterior guidance.
2. The posterior teeth are built first and then disoccluded by developing the anterior guidance. This method is backward. Anterior guidance is an important guiding factor of posterior occlusal form and thus should be developed at the start. When posterior occlusal form determines the anterior guidance, the correctness of the anterior guidance is doubtful.

Posterior disclusion can be developed by two methods of anterior guidance:

Anterior group function and cuspid protected occlusion. Cuspid-protected occlusion is defined as dis-occlusion by the cuspids of all other teeth in lateral excursions. It usually serves as the cornerstone of what is called mutually protected occlusion<sup>[7]</sup>. Lucia (1961) described advantages of a mutually protected occlusion as the following:

## LITERATURE REVIEW

1. A cusp to fossa relationship produces an interlocking of upper and lower components-giving a maximum support in centric relation in all directions.
2. The force is clearly closer to the long axis of each tooth.
3. The arrangement of the marginal, transverse and oblique ridges have a shearing action - make a more efficient chewing apparatus<sup>[9]</sup>.

Mutually protected occlusion cannot be given to those patients whose periodontium is compromised. While group function occlusion has the following advantages:

1. Teeth on the working side distributes the occlusal stress evenly.
2. The absence of contact on the nonworking side prevents those from getting subjected to destructive, obliquely directed forces found in nonworking interferences.
3. Horizontal pressures during lateral movements are distributed to one half of the arch on the working side.
4. It also saves centric holding cusps that is; mandibular buccal cusps and maxillary palatal cusps from excessive wear.

Pankey Mann Schyuler's philosophy<sup>[15]</sup> advocates that condylar guidance does not dictate anterior guidance. Thus, it advises development of the anterior guidance for best possible aesthetics, function and comfort.

Advantages of this technique are that it is possible to diagnose and plan the treatment for entire rehabilitation before preparing a single tooth, it is a well-organized logical procedure that progresses smoothly, there is never a need for preparing or building more than 8 teeth at a time, there is no danger of losing patient's vertical dimension, all posterior occlusal forms are in harmony with both condylar movements and a developed anterior guidance. Hobo and Takayama stated that anterior guidance influenced the working condylar path and concluded that they were dependent factors<sup>[12]</sup>. According to

them, posterior disclusion is depends on: the angle of hinge rotation created by the angular difference between anterior guidance and condylar path, and on inclination and shape of posterior cusps which helps in managing damaging non axial forces. They concluded that cusp angle be considered as the most reliable factor of occlusion as cusp angle does not deviate and is 4 times more reliable than the condylar and incisal path which shows variation. Though independent of condylar path as well as incisal path, a standard value for cusp angle was determined such that it may compensate for wear of natural dentition due to caries, abrasion and restorative works. By using the standard cusp angle, it was possible to establish the fixed amount of disclusion. Disclusion is required in Full Mouth Rehabilitation as molar disclusion during eccentric movements is effective in eliminating harmful lateral occlusal forces and the anterior teeth, being farthest from the fulcrum are minimally influenced by the varied amount of flexion caused by the closing musculature, and thus are in the best position to carry the load. And also posterior teeth contact should be avoided during incising especially in protrusive movements as interferences in protrusion are the most damaging. Youdelis in 1971 proposed an occlusal scheme for advanced periodontitis cases<sup>[16]</sup>. The goal was to achieve simultaneous interocclusal contact of posterior teeth in centric relation position with forces directed along the long axis. Anterior disclusion is developed for protrusive excursions and canine disclusion for lateral movements. Cuspal anatomy is so arranged that if the canine disclusion is lost through wear or tooth movement, the posterior teeth goes into group function. According to Nyman and Lindhe Scheme for extremely advanced periodontitis cases even contact should be provided in the intercuspal position, although no great emphasis is placed upon the type of contacts<sup>[17]</sup>. When distal intercuspation is available, anterior disclusion should be achieved. Before beginning the treatment procedure, one must plan whether there is a need for full mouth simultaneous technique which advocates the simultaneous restoration of both arches or



## LITERATURE REVIEW

quadrant/segment technique, where completion of restorations of one quadrant in a planned sequence is done before proceeding to another<sup>[18]</sup>. In case of segmented simultaneous technique, a combination of the desired features of the full mouth simultaneous rehabilitation and the programmed quadrant approach into a single re-constructive technique is done. This technique simplifies the basic procedures for reconstructions while permitting the dentist to use a suitable occlusal scheme and philosophy for a particular patient.

**Conclusion:** Every occlusal form, occlusal scheme and philosophy has its own unique advantage over others that can be used to restore posterior teeth.

Whichever design is selected suiting the specific patient should be chosen because it :

1. Directs the forces to the long axis of each tooth as much as practically possible
2. Distributes the lateral stress to get a favorable outcome in varying situations of periodontal compromise
3. Provides maximum stability
4. Provides maximum wear-ability
5. Provides optimum masticatory function

The risk benefit ratio should also be weighed and the least cumbersome approach in terms of effort, time and finances achieving the most optimum result should be chosen.

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